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(54) ELECTRIC LAMP HAVING WELDED COMPONENTS AND A METHOD OF PRODUCING THE LAMP

(71) We, PATENT - TREUHAND-GESELLSCHAFT FUR ELEKTRISCHE, GLUHLAMPEN m.b.H., of 1, Hellabrunner Strasse, 8 München 90, Federal Republic of Germany, a German Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to an electric lamp comprising an envelope of quartz glass or some other glass of similar high silica content, molybdenum foils pinch-sealed into the lamp envelope, and lamp components of a refractory metal, for example of molybdenum of tungsten, welded to the ends of the foils, and to a method for producing the lamp.

In the production of lamps of this type it is well known to use expensive platinum as an intermediate layer in the welding of the lamp components to the ends of the molybdenum foils (which after the welds have been made are pinch-sealed into the lamp envelope), in order to obtain a stable weld which is resistant in operation of the lamps and is heat-proof as particularly required during the pinch-sealing operation.

The German Offenlegungsschrift No. 1,527,384 described a method and device for ultrasonic welding of a ductile metal such as aluminium or copper, to a hard material such as glass or other glass-like or ceramic materials, or to a metal such as tungsten or molybdenum.

Unexpectedly, it has been found that by welding the lamp components to the ends of the molybdenum foils prior to the pinch-sealing of the foils into the lamp envelope, when using less expensive aluminium as an intermediate layer, a weld is obtained which is equivalent to a weld with platinum as an intermediate layer, not only with regard to its solidity and resistance during operation of the lamp, but also in that it possesses the same temperature-resistance as the former for the pinch-sealing operation which follows welding, although, as is known, the melting point of aluminium is considerably lower than the temperature which prevails during the pinch-sealing operation.

According to the invention there is provided an electric lamp comprising an envelope of quartz glass or some other glass of similar high silica content, molybdenum foils pinch-sealed into the lamp envelope, and lamp components of a refractory metal welded to the ends of the foils, the welds between the molybdenum foils and at least those refractory metal lamp components extending externally of the lamp each including an intermediate layer of aluminium.

The invention also provides a method of producing an electric lamp as described above, comprising welding at least those lamp components extending externally of the lamp by ultrasonic energy to the molybdenum foils using an intermediate layer of aluminium between each lamp component and foil, prior to the pinch-sealing of the foil in the lamp envelope.

The invention will be explained in greater detail with reference to an exemplary embodiment of a lamp in accordance with the invention.

Figure 1 shows an electric lamp such as, for instance, a halogen incandescent lamp in accordance with the invention.

Figure 2 shows the same lamp turned through 90°.

Figure 3 shows a welding device.

The halogen incandescent lamp 1 consists of a light-transmissive envelope, such as quartz glass, one end of which is sealed by an exhaust tip 2 and the other end by flat

pinching. The lamp is filled with gas such as nitrogen which will not react with other substances present and with a halogen additive such as hydrogen bromide.

Two molybdenum foils are pinch-sealed into the flat pinch 3, having been previously welded by ultrasonic energy to the base pins 7 of molybdenum or tungsten using an aluminium foil 16 as an intermediate layer. The thickness of the aluminium foil may be up to 0.1 mm. The thickness of the molybdenum foils is about 15 to 60 μ. As an alternative for the intermediate layer, aluminium powder which is formed into a paste by a volatile vehicle may be used.

Also prior to the pinch-sealing of the foils 4, the ends of a tungsten or molybdenum filament 5 are welded to the molybdenum foils 4 in known manner using an intermediate layer 6 of platinum. Instead of the intermediate layer of platinum 6, aluminium may alternatively be provided as an intermediate layer. The aluminium may be used in form of a foil up to 0.1 mm thick or as a powder formed into a paste by a volatile vehicle. The welding of the filament ends to the molybdenum foils 4 is preferably effected by ultrasonic energy.

Figure 3 is a schematic view of an ultrasonic generator 8 with a sonotrode 9, for instance of steel. The sonotrode comprises a bore 10, into which a cylindrical body 11, for instance of steel, having a frusto-conical tip 12 is inserted. A hard body 14 consisting for instance of sintered alumina, with a particle size of from 3 to 5 μ, is pressed into the bore 13 in the tip 12.

For producing the weld between each base pin 7 and its foil 4, the flat end portion of the base pin is laid on an anvil 15 of hard metal. An aluminium foil 16 is located on the base pin, and thereon the molybdenum foil 4. Instead of an aluminium foil, an aluminium powder formed into a paste with ethanol may alternatively be used. The molybdenum foil and the base pin overlap one another up to approximately 5 mm. Then the components are welded by ultrasonic energy at a sonotrode pressure of 25—40 kg/cm^2.

The rough surface of the sintered alumina body 14 prevents sliding of the sonotrode on the molybdenum foil.

After welding the ends of the tungsten or molybdenum filament 5 to the molybdenum foils 4, the foils 4 are pinch-sealed into the lamp envelope.

WHAT WE CLAIM IS:—

1. An electric lamp comprising an envelope of quartz glass or some other glass of similar high silica content, molybdenum foils pinch-sealed into the lamp envelope, and lamp components of a refractory metal welded to the ends of the foils, the welds between the molybdenum foils and at least those refractory metal lamp components extending externally of the lamp each including an intermediate layer of aluminium.

2. An electric lamp as claimed in Claim 1, wherein the lamp components extending externally of the lamp are welded to the molybdenum foils by ultrasonic energy.

3. An electric lamp as claimed in Claim 1 or Claim 2, wherein each intermediate layer consists of an aluminium foil up to 0.1 mm thick.

4. An electric lamp as claimed in any one of Claims 1 to 3, wherein the thickness of each pinch-sealed molybdenum foil lies within the range 15—60 μ.

5. An electric lamp as claimed in any one of Claims 1 to 4, wherein the lamp components extending internally of the lamp are welded by ultrasonic energy to the molybdenum foils using an intermediate layer of aluminium between each lamp component and foil.

6. An electric lamp as claimed in any preceding claim wherein the said refractory metal is molybdenum.

7. An electric lamp as claimed in any one of claims 1 to 5, wherein the said refractory metal is tungsten.

8. An electric lamp as claimed in any preceding claim wherein the said lamp components extending externally of the lamp are base pins.

9. A method for the production of an electric lamp as claimed in any preceding claim, wherein at least the lamp components extending externally of the lamp are welded by ultrasonic energy to the molybdenum foils using an intermediate layer of aluminium between each lamp component and foil, prior to the pinch-sealing of the foil in the lamp envelope.

10. A method for the production of an electric lamp as claimed in claim 9, wherein each intermediate layer of aluminium consists of an aluminium foil, or an aluminium powder which is formed into a paste by a volatile vehicle.

11. A method for the production of an electric lamp as claimed in Claim 9, wherein the lamp components extending internally of the lamp are welded by ultrasonic energy to the molybdenum foils using aluminium powder formed into a paste by a volatile vehicle.

12. An electric lamp substantially as herein

described with reference to and as illustrated in the accompanying drawings.

13. A method of producing an electric lamp substantially as herein described with reference to and as illustrated in the accompanying drawings.

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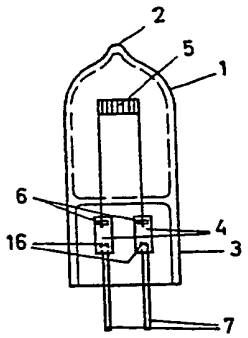

FIG. 1

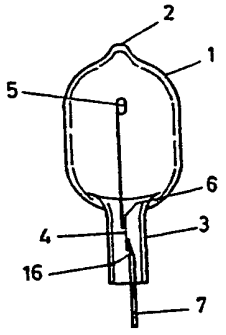

FIG. 2

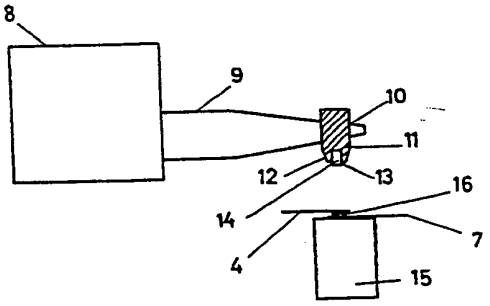

FIG. 3